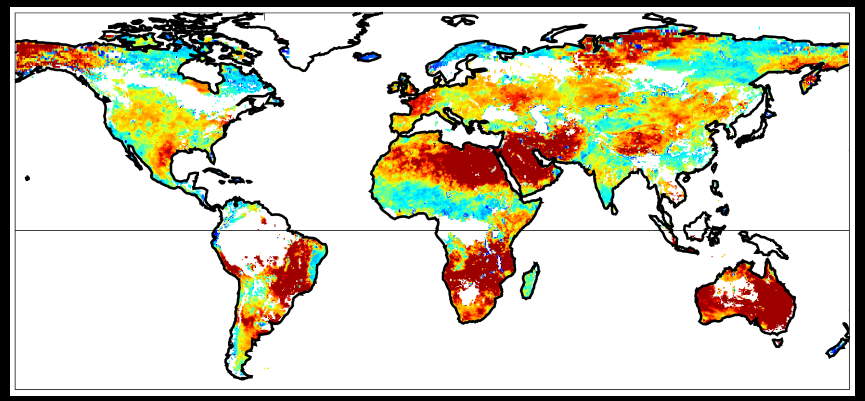
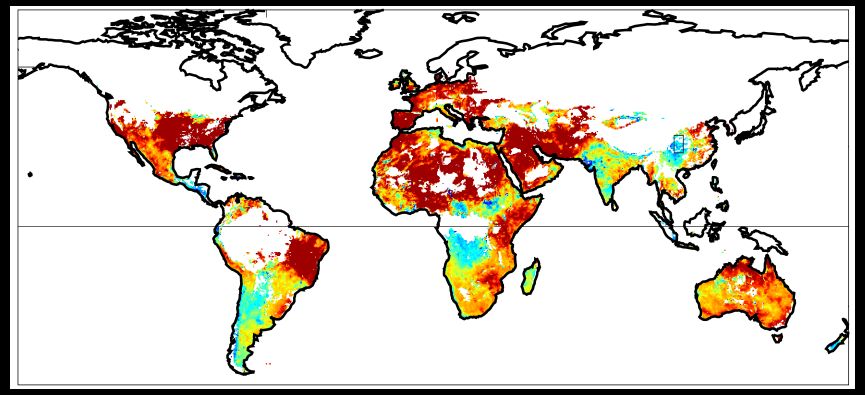
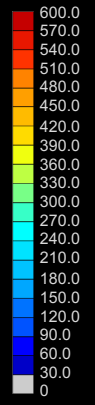
Length Scales of Hydrological Variability as Inferred from SMAP Soil Moisture Retrievals

Spatial Correlation Length Scale from SMAP (km): MJJAS

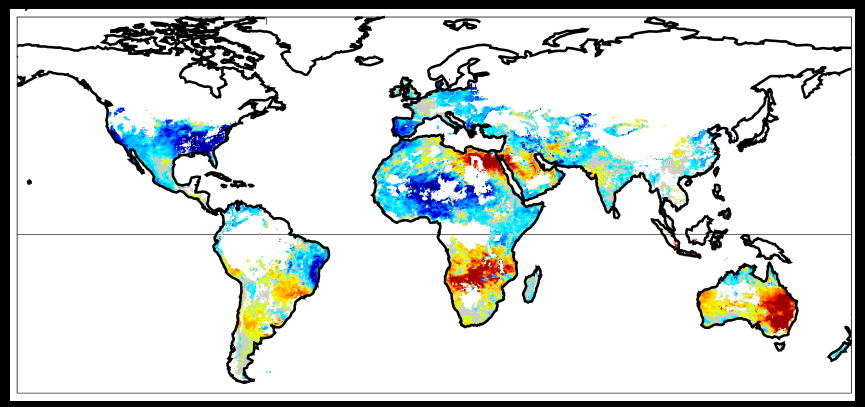


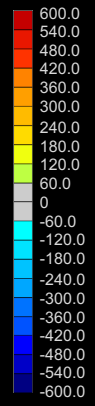
Spatial Correlation Length Scale from SMAP (km): NDJFM





Differences: MJJAS minus NDJFM





The length scale plotted at a given point represents the distance one can travel from that point and still have similar time variations in soil moisture (with a correlation at or above 1/e). These length scales were estimated from SMAP near-surface soil moisture data for the Northern Hemisphere warm season (May–September, or MJJAS) *(top)* and cold season (November through March, or NDJFM) *(middle)*. Areas of insufficient data are whited out in the plots. The difference between the warm season and cold season length scales *(bottom)* reflects the different character of precipitation in those seasons – warm season precipitation is generally dominated by moist convection, which operates at relatively small spatial scales.

SMAP data provide a unique global picture of this important facet of hydrological variability, a picture that is arguably unattainable with other datasets. Among other applications, the above maps can serve as targets for climate model validation.